

4.5 – Graphing Rational Functions

Key
Selected
Answers!

Name _____ Date _____ Period _____

Graph each rational function without technology and determine the domain, asymptotes, intercepts and holes (if any).

1. $f(x) = \frac{3}{x+7}$

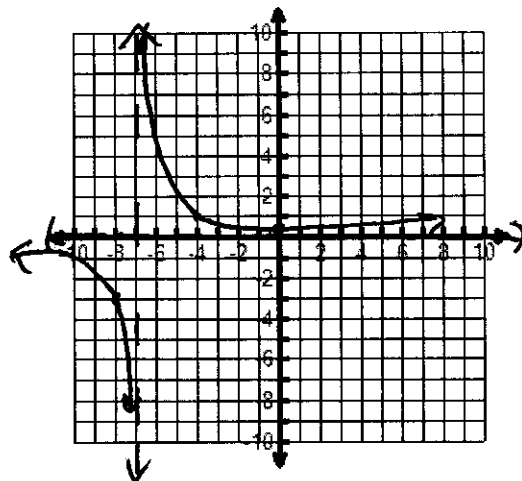
Domain $(-\infty, -7) \cup (-7, \infty)$

vertical asymptotes $x = -7$

horizontal or oblique asymptote $y = 0$

x-intercepts none

y-intercept $(0, 3/7)$ hole none



2. $f(x) = \frac{x-5}{x^2-16}$

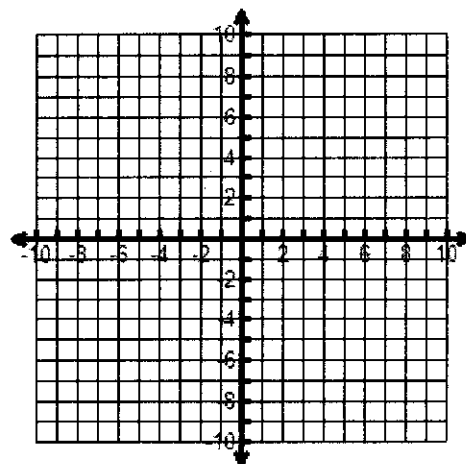
Domain _____

vertical asymptotes _____

horizontal or oblique asymptote _____

x-intercepts _____

y-intercept _____ hole _____



3. $f(x) = \frac{-4x+1}{x-2}$

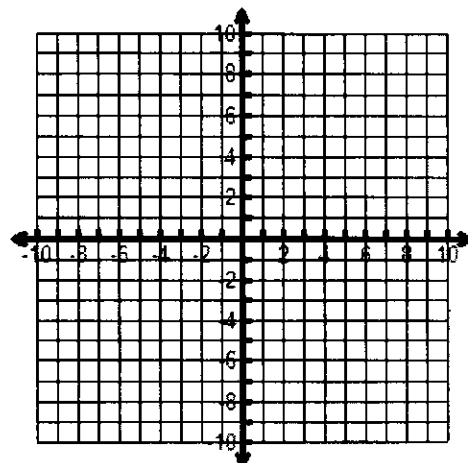
Domain _____

vertical asymptotes _____

horizontal or oblique asymptote _____

x-intercepts _____

y-intercept _____ hole _____



4. $f(x) = \frac{2x^2-9x+4}{x^2-7x+10} = \frac{(2x-1)(x-4)}{(x-5)(x-2)}$

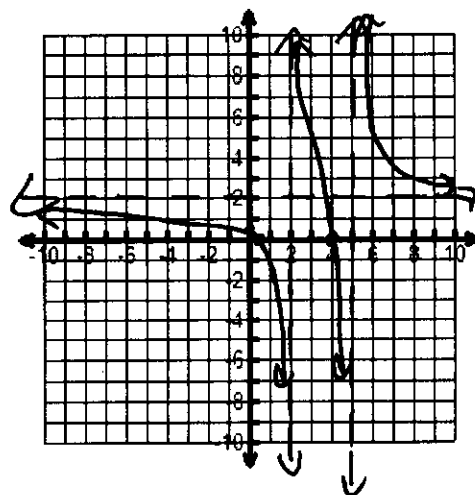
Domain $(-\infty, 2) \cup (2, 5) \cup (5, \infty)$

vertical asymptotes $x=2, x=5$

horizontal or oblique asymptote $y=2$

x-intercepts $(\frac{1}{2}, 0) (4, 0)$

y-intercept $(0, \frac{2}{5})$ hole none



$$5. f(x) = \frac{x^2+x-42}{x-4} \frac{(x+7)(x-6)}{x-4}$$

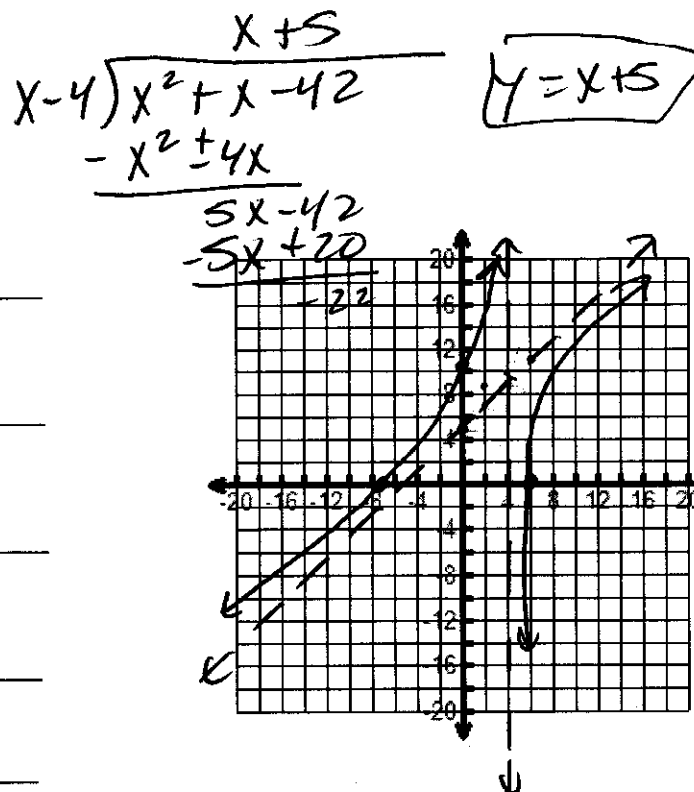
Domain $(-\infty, 4) \cup (4, \infty)$

vertical asymptotes $x=4$

horizontal or oblique asymptote $y=x+5$

x-intercepts $(-7, 0)$ $(6, 0)$

y-intercept $(0, \frac{21}{2})$ hole none



$$6. f(x) = \frac{x^2+x-30}{3x^2-12}$$

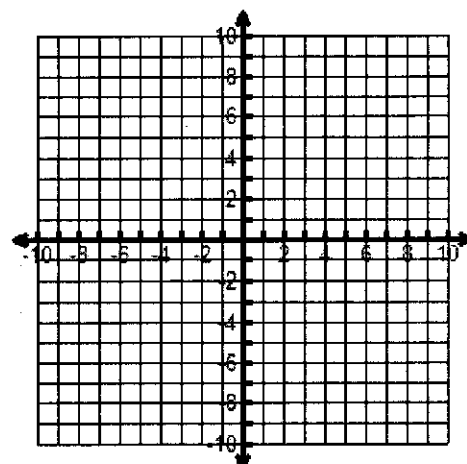
Domain _____

vertical asymptotes _____

horizontal or oblique asymptote _____

x-intercepts _____

y-intercept _____ hole _____



9. $f(x) = \frac{3x^2 - x}{x+1}$

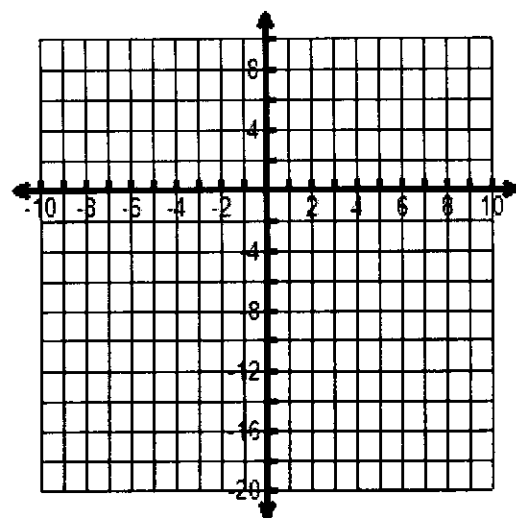
Domain _____

vertical asymptotes _____

horizontal or oblique asymptote _____

x-intercepts _____

y-intercept _____ hole _____



10. $f(x) = \frac{x-7}{x^2-4x-21} \cdot \frac{x-7}{(x-7)(x+3)} = \frac{1}{x+3}$

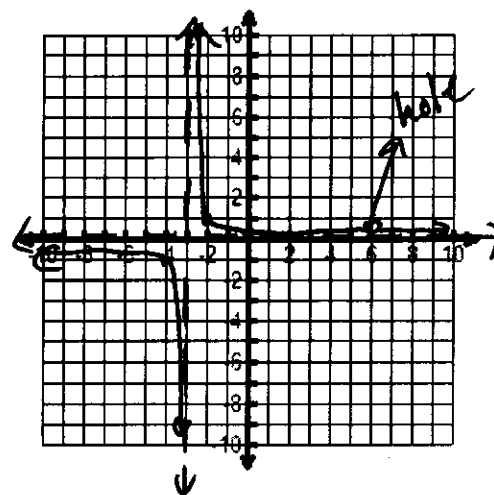
Domain $(-\infty, -3) \cup (-3, 7) \cup (7, \infty)$

vertical asymptotes $x = -3$

horizontal or oblique asymptote $y = 0$

x-intercepts none

y-intercept $(0, 1/3)$ hole $(7, 1/10)$



11. $f(x) = \frac{x+2}{x^2-x-6}$

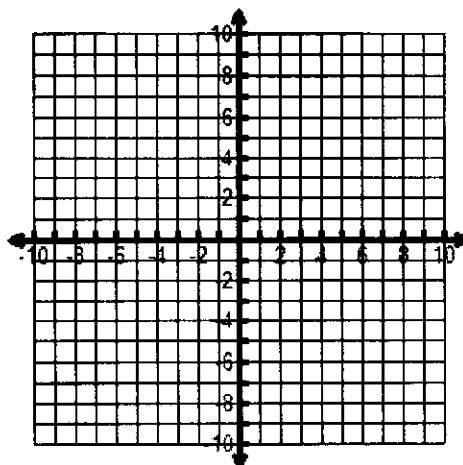
Domain _____

vertical asymptotes _____

horizontal or oblique asymptote _____

x-intercepts _____

y-intercept _____ hole _____



Review Problems

Solve the following equations: *Show work!*

12. $\frac{x}{x+1} + \frac{5}{x} = \frac{1}{x^2+x}$ *$x \neq 0, x \neq -1$*

*$x = -4$
 $x = -1 \rightarrow$ extraneous*

13. $\frac{3}{x^2-6x+9} + \frac{x-2}{3x-9} = \frac{x}{2x-6}$

14. $\frac{x-2}{x-4} = \frac{2}{x-4}$

15. $\frac{x^2-1}{x+2} = \frac{3}{x+2}$

16. Use the graph from problem number 1 to describe the asymptotical behavior.

$$\lim_{x \rightarrow -7^-} f(x) = \underline{\hspace{2cm}} \qquad \lim_{x \rightarrow -7^+} f(x) = \underline{\hspace{2cm}}$$

17. Use the graph from problem number 4 to describe the asymptotical behavior.

$$\lim_{x \rightarrow 2^-} f(x) = \underline{-\infty} \qquad \lim_{x \rightarrow 2^+} f(x) = \underline{\hspace{2cm}}$$

$$\lim_{x \rightarrow 5^-} f(x) = \underline{\hspace{2cm}} \qquad \lim_{x \rightarrow 5^+} f(x) = \underline{\hspace{2cm}}$$

18. Use the graph from problem number 6 to describe the asymptotical behavior. Use limits and write them properly like in problems 16-17. You should have 4 limits here.

a) $\lim_{x \rightarrow -2^-} f(x) = -\infty$

b)

c)

d)